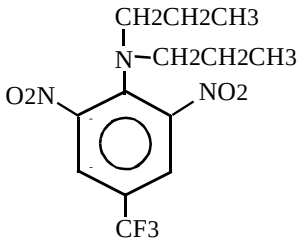
TRIFLURALIN

Trifluralin is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 1582-09-8

Molecular Formula: $C_{13}H_{16}F_3N_3O_4$



Trifluralin occurs as yellow crystals. It is slightly soluble in water and freely soluble in acetone, Stoddard solvent, and xylene (Merck, 1989).

Physical Properties of Trifluralin

Synonyms: 2,6-dinitro-n,n-dipropyl-4-(trifluoromethyl)benzenamine; n,n-dipropyl-2,6-dinitro-4-trifluoromethylaniline; Lilly 36352; Treflan; Triflurex

Molecular Weight:	335.29
Boiling Point:	139 - 140 °C at 4.2 mm Hg
Melting Point:	46 - 47 °C
Vapor Pressure:	1.99 x 10^{-4} mm Hg at 29.5 °C
Log Octanol/Water Partition Coefficient:	5.3
Conversion Factor:	1 ppm = 13.71 mg/m^3

(HSDB, 1991; Merck, 1989)

SOURCES AND EMISSIONS

A. Sources

Trifluralin is registered as a herbicide. It is available as an impregnated material, a granular, an emulsifiable concentrate, or microencapsulated formula. As an impregnated material, it is used as a weed barrier around underground pipes and cables, beneath sidewalks and bike paths, and beneath roadways, curbs and building foundations. Trifluralin as a granular, an emulsifiable concentrate, or microencapsulated formula, may be used as a pre-plant/pre-emergence herbicide in a variety of agricultural settings for the control of annual and perennial grasses and broadleaf weeds. Trifluralin is also registered for use by the general public for the control of weeds in and around gardens, lawns, and residences (DPR, 1996).

The licensing and regulation of pesticides for sale and use in California are the responsibility of the Department of Pesticide Regulation (DPR). Information presented in this fact sheet regarding the permitted pesticidal uses of trifluralin has been collected from pesticide labels registered for

use in California and from DPR's pesticide databases. This information reflects pesticide use and permitted uses in California as of October 15, 1996. For further information regarding the pesticidal uses of this compound, please contact the Pesticide Registration Branch of DPR (DPR, 1996).

B. Emissions

No emissions of trifluralin from stationary sources in California were reported, based on data obtained from the Air Toxics "Hot Spots" Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

No information about the natural occurrence of trifluralin was found in the readily-available literature.

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements of trifluralin. However, the United States Environmental Protection agency (U.S. EPA) has compiled ambient air data for trifluralin from a location in Canada from 1988-89. These data reported a mean concentration of 0.27 nanograms per cubic meter (ng/m^3) with a range of 0 to 3.4 ng/m^3 (U.S. EPA, 1993a).

INDOOR SOURCES AND CONCENTRATIONS

No information about the indoor sources and concentrations of trifluralin was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

Trifluralin exists in the atmosphere in the gas phase. The dominant atmospheric loss processes for trifluralin are expected to be by reaction with the hydroxyl (OH) radical and photolysis. The measured half-life and lifetime of trifluralin in a 17 cubic meter chamber due to photolysis were 0.3 to 1.2 hours and 0.5 to 1.8 hours, respectively, for summertime midday conditions at the latitude of Reno, Nevada (Mongar and Miller, 1988). The OH radical reaction is also expected to be rapid, with an atmospheric half-life and lifetime of trifluralin estimated to be about 3 hours and 4 hours, respectively. It is important to note that the estimated half-life and lifetime of trifluralin due to reaction with the OH radical are less than or equal to 1 hour at solar noon during summertime (Atkinson, 1995).

AB 2588 RISK ASSESSMENT INFORMATION

Trifluralin emissions are not reported from stationary sources in California under the AB 2588 program. It is also not listed in the California Air Pollution Control Officers

Association Air Toxics “Hot Spots” Program Revised 1992 Risk Assessment Guidelines as having health values (cancer or non-cancer) for use in risk assessments (CAPCOA, 1993).

HEALTH EFFECTS

Probable routes of human exposure to trifluralin are inhalation, ingestion, and dermal contact.

Non-Cancer: Information on the effects of acute exposure of humans to trifluralin is not available. Acute animal tests (LC_{50}, LD_{50}) in rats, mice, and rabbits, have demonstrated trifluralin to have moderate acute toxicity by inhalation and low to moderate acute toxicity by oral or dermal exposure. No information is available on the chronic effects of trifluralin in humans. Dogs, chronically exposed to trifluralin in their diet, were found to have decreased weight gain, changes in hematological parameters, and increased liver weight (U.S. EPA, 1994a).

The U.S. EPA has not established a Reference Concentration (RfC) for trifluralin, but has set an oral Reference Dose (RfD) of 7.5×10^{-3} milligrams per kilogram per day based on increased liver weights and an increase in methemoglobinemia in dogs. The U.S. EPA estimates that consumption of this dose or less, over a lifetime, would not likely result in the occurrence of non-cancer chronic effects (U.S. EPA, 1994a).

No information is available on adverse reproductive or developmental effects of trifluralin in humans. Offspring of mice, exposed by gavage, were observed to develop skeletal abnormalities. Depressed fetal weight was seen in rats and rabbits exposed by gavage. Fetotoxic and teratogenic effects have been observed in other rodent studies (U.S. EPA, 1994a).

Cancer: No information is available on the carcinogenic effects of trifluralin in humans. While increased urinary tract and thyroid tumors were observed in rats exposed to trifluralin in their diet, no statistically significant increase in tumors was found in four other rodent studies. Trifluralin is structurally similar to ethalfluralin, a carcinogen in the rat; both compounds produce a common urinary metabolite in rats that produces nonneoplastic renal pathology. N-Nitroso-di-n-propylamine (NDPA), an unavoidable contaminant in trifluralin-containing products, has been found to be a carcinogen in rodents (U.S. EPA, 1994a).

The U.S. EPA has classified trifluralin in Group C: Possible human carcinogen, based on limited animal and no human evidence. The U.S. EPA has calculated an oral unit risk estimate of 2.2×10^{-7} $(\text{microgram per liter})^{-1}$. The U.S. EPA estimates that if an individual were to drink water containing trifluralin at 5.0 micrograms per liter over an entire lifetime, that person would theoretically have no more than a 1 in 1 million increased chance of developing cancer (U.S. EPA, 1994a). The International Agency for Research on Cancer has classified trifluralin in Group 3: Not classifiable as to its human carcinogenicity (IARC, 1991a).